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14. ABSTRACT
We collect contributions from the participants of the “Information in Dynamical Systems and Complex Systems” workshop, which cover a wide range of important problems and new approaches that lie in the intersection of information theory and dynamical systems. The contributions include theoretical characterization and understanding of the different types of information flow and causality in general stochastic processes, inference and identification of coupling structure and parameters of system dynamics, rigorous coarse-grain modeling of network dynamical systems, and exact statistical testing of fundamental information theoretic quantities such as the mutual

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Report Title

Final Report: Information in Dynamical Systems and Complex Systems Summer 2013 Workshop

ABSTRACT

We collect contributions from the participants of the “Information in Dynamical Systems and Complex Systems” workshop, which cover a wide range of important problems and new approaches that lie in the intersection of information theory and dynamical systems. The contributions include theoretical characterization and understanding of the different types of information flow and causality in general stochastic processes, inference and identification of coupling structure and parameters of system dynamics, rigorous coarse-grain modeling of network dynamical systems, and exact statistical testing of fundamental information-theoretic quantities such as the mutual information. The collective efforts reported herein reflect a modern perspective of the intimate connection between dynamical systems and information flow, leading to the promise of better understanding and modeling of natural complex systems and better/optimal design of engineering systems.

Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:

(a) Papers published in peer-reviewed journals (N/A for none)

Received		Paper
08/07/2014	1.00	Erik M. Bollt, Jie Sun. Editorial Comment on the Special Issue of “Information in Dynamical Systems and Complex Systems”, Entropy, (09 2014): 0. doi:
08/07/2014	3.00	Jie Sun, Carlo Cafaro, Erik M. Bollt. Identifying the Coupling Structure in Complex Systems through the Optimal Causation Entropy Principle, Entropy, (07 2014): 3416. doi:
08/07/2014	4.00	Justin Bush, Konstantin Mischaikow. Coarse Dynamics for Coarse Modeling: An Example From Population Biology, Entropy, (07 2014): 3379. doi:
08/07/2014	5.00	Shawn D. Pethel, DanielW. Hahs. Exact Test of Independence Using Mutual Information, Entropy, (07 2014): 2839. doi:
08/07/2014	6.00	Nicholas F. Travers, James P. Crutchfield. Infinite Excess Entropy Processes with Countable-State Generators, Entropy, (07 2014): 1396. doi:
08/07/2014	7.00	Sachit Butail, Fabrizio Ladu, Davide Spinello, Maurizio Porfiri. Information Flow in Animal-Robot Interactions, Entropy, (07 2014): 1315. doi:
TOTAL:	**6**	

Number of Papers published in peer-reviewed journals:

(b) Papers published in non-peer-reviewed journals (N/A for none)

Received		Paper
08/07/2014	2.00	Ri-Qi Su, Ying-Cheng Lai , Xiao Wang . Identifying Chaotic FitzHugh–Nagumo Neurons Using Compressive Sensing, Entropy, (07 2014): 3889. doi:
TOTAL:	**1**	

Number of Papers published in non peer-reviewed journals:

(c) Presentations

All papers were presented at the workshop

Number of Presentations: 0.00

Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received	Paper
TOTAL:	

Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received	Paper
TOTAL:	

Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):

(d) Manuscripts

Received Paper

TOTAL:

Number of Manuscripts:

Books

Received Book

TOTAL:

Received Book Chapter

TOTAL:

Patents Submitted

Patents Awarded

Awards

Graduate Students

NAME	PERCENT_SUPPORTED

FTE Equivalent:
Total Number:

Names of Post Doctorates

NAME	PERCENT_SUPPORTED

FTE Equivalent:
Total Number:

Names of Faculty Supported

NAME	PERCENT_SUPPORTED

FTE Equivalent:
Total Number:

Names of Under Graduate students supported

NAME	PERCENT_SUPPORTED

FTE Equivalent:
Total Number:

Student Metrics

This section only applies to graduating undergraduates supported by this agreement in this reporting period

The number of undergraduates funded by this agreement who graduated during this period: 0.00
The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields:..... 0.00
The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields:..... 0.00
Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale):..... 0.00
Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering:..... 0.00
The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense 0.00
The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields: 0.00

Names of Personnel receiving masters degrees

NAME

Total Number:

Names of personnel receiving PHDs

NAME
Total Number:

Names of other research staff

NAME	PERCENT_SUPPORTED
Diane Brauer	0.10
FTE Equivalent:	**0.10**
Total Number:	**1**

Sub Contractors (DD882)

Inventions (DD882)

Scientific Progress

This conference significantly advanced the understanding regarding the connections between complex systems, information flow therein and the connections to inference of such systems. The conference also served to cement relationships and cooperation between important players in these fields.

Technology Transfer

The attached manuscripts were part of a special issue that was published in the prestigious international journal entitled Entropy, in an issue entitled,

Special Issue "Information in Dynamical Systems and Complex Systems"

Which summarized the groups findings for the entire scientific community worldwide to enjoy and benefit from our findings.